Two-Sample Testing

μ or avg Mean population average

$\bar{x}$ or savg means sample average

Before we tested:

H_0: $\mu = 0$ (differences due to chance)

H_1: $\mu > 0$ (or $\mu < 0$)

Now we test

H_0: $\mu_1 = \mu_2$

is equivalent to

H_0: $\mu_1 - \mu_2 = 0$

H_1: $avg_1 - avg_2 > 0$ (or < 0)

Under the null

$$EV(savg_1 - savg_2) = 0.$$

$$SE_{diff} := SE(savg_1 - savg_2)$$

$$= \sqrt{SE_1^2 + SE_2^2}$$

$$= \sqrt{\left(\frac{sd_1}{\sqrt{\#draws_1}}\right)^2 + \left(\frac{sd_2}{\sqrt{\#draws_2}}\right)^2}$$

$$Z = \frac{(savg_1 - savg_2) - 0}{SE_{diff}}$$

If box 0,1 box.

how to get SD_1, SD_2?

(holds for % as well)

$$avg = \frac{\#1}{total}$$

if $H_0: avg_A = avg_B$

$$\Rightarrow \frac{\#1_A}{total_A} = \frac{\#1_B}{total_B} = p$$

$$Sd_A = \sqrt{p(1-p)} = Sd_B$$

So to estimate SD

$$p^* := \text{pooled prop} = \frac{\#1_{SA} + \#1_{SB}}{\#\text{draws}_A + \#\text{draws}_B}$$

$$\widehat{SD}_{p^*} = \sqrt{p^*(1-p^*)}$$

$\#1_{SA}$:= the number of one's drawn in sample A